Claims:

1. An optical lens comprising at least one holographic optical element and at least one focusing element, said holographic optical element characterized by an interference fringe pattern having a finite ray acceptance angle range that diffracts up to 100% of incoming light when the Bragg condition is met, said holographic optical element further characterized as possessing substantially neutral focusing power.

2. An optical lens according to claim 1 wherein said optical lens is biocompatiable.

3. An optical lens according to claim 1 wherein said optical lens is a contact lens.

4. An optical lens according to claim 1 wherein said optical lens is a spectacle lens.

5. An optical lens according to claim 1 wherein said optical lens is an intraocular lens.

6. An optical lens according to claim 1 wherein said holographic optical lens element is a transmission volume holographic optical lens element.

7. An optical lens according to claim 1 wherein said holographic optical lens element is a reflective holographic optical lens element.

8. An optical lens comprising a first holographic optical element and a second holographic optical element, said holographic optical elements being adjacent and having non-overlapping and finite ray acceptance angle ranges that diff ract up to 100% of incoming light when the Bragg condition is met, said first and second holographic elements being switchable such that when one holographic optical element is active the other is inactive.

9. An optical lens according to claim 8 further comprising a first focusing optical element situated adjacent a surface of said first holographic optical element.

10. An optical lens according to claim 8 further comprising a second focusing optical element situated adjacent a surface of said second hol ographic optical element.

11. An optical lens according to claim 8 wherein said optical lens is biocompatible.

12. An optical lens according to claim 8 wherein said optical lens is a contact lens.

13. An optical lens according to claim 8 wherein said optical lens is a spectacle lens.

14. An optical lens according to claim 8 wherein said optical lens is an intraocular lens.

15. An optical lens according to claim 8 wherein said holographic optical lens element is a transmission volume holographic optical lens element.

16. An optical lens according to claim 8 wherein said holographic optical lens element is a reflective holographic optical lens element.

17. An optical lens comprising a first optical component and a second optical component, said first optical component comprising a holographic optical element having a first interference fringe pattern and said second optical component comprising a holographic optical element having a second interference fringe pattern wherein said first and second interference fringe patterns are arranged such that when one interference fringe pattern is active the other is not.

18. An optical lens according to claim 17 wherein said first optical component further comprises a focusing element.

19. An optical lens according to claim 17 wherein said second optical component further comprises a focusing element.

20. An optical lens according to claim 17 wherein said optical lens is biocompatible.

21. An optical lens according to claim 17 wherein said optical lens is a contact lens.

22. An optical lens according to claim 17 wherein said optical lens is a spectacle lens.

23. An optical lens according to claim 17 wherein said optical lens is an intraocular lens.

24. An optical lens according to claim 17 wherein said hologr aphic optical lens element is a transmission volume holographic optical lens element.

25. An optical lens according to claim 17 wherein said holographic optical lens element is a reflective holographic optical lens element.

26. A method for producing a switching holographic element which comprises the steps of:
a) providing a first source light beam;
b) splitting the first source light beam into first and second light beams, wherein one of the light beams is a reference beam;
c) providing a recordable hol ographic medium having oppositely located first and second surfaces, said surfaces being flat, concave or convex;
d) directing the first and second light beams to a surface of the recordable holographic medium; wherein, the first and second light beams have proper phase relationships to record a volume grating structure within the recordable holographic medium.

27. The method of claim 26 wherein the recordable holographic element comprises a crosslinkable or polymerizable optical material.

28. The method of claim 27 wherein the recordable holographic element is a fluid optical material that forms a non-fluid optical material when exposed to the first and second light beams.

29. The method of claim 28 wherein the recordable holographic element further comprises an UV absorber.

30. The method of claim 28 wherein the method further comprises the step of post curing the recorded optical element with a UV light source.

31. The method of claim 26 wherein the step of directing the first and second light beams t o a surface of the recordable holographic element comprises directing the first and second light beams onto the same surface of the recordable holographic element.

32. The method of claim 26 wherein the step of directing the first and second light beams t o a surface of the recordable holographic element comprises directing the first light beam onto the first surface of the recordable holographic element and directing the second light beam onto the second surface of the recordable holographic element.

33. A method for producing an optical lens comprising switching holographic elements, the method comprising the steps of:

a) providing a first source light beam;

b) splitting the first source light beam into first and second light beams;

c) providing a recordable holographic element having first and second surfaces, said first and second surfaces each having first and second portions;

d) directing the first and second light beams to the first portion of the first surface of the recordable holographic element;

e) providing a second source light beam;

f) splitting the second source light beam into third and fourth light beams;

g) directing the third and fourth light beams to the second portion of the first surface of the recordable holographic element; wherein,

the first and second light beams have proper phase relationships to record a transmission volume grating structure within the first portion of the first surface of the recordable holographic element and the third and fourth light beams have proper phase relationships to record a second transmission volume grating structure within the second portion of the first surface of the recordable holographic element.

34. The method of claim 33 wherein steps (a), (b) and (d) occur simultaneously with steps (e), (f) and (g).

35. The method of claim 33 wherein steps (a), (b) and (d) occur prior to steps (e), (f) and (g).

36. The method of claim 33 wherein the recordable holographic element comprises a crosslinkable or polymerizable optical material.

37. The method of claim 36 wherein the recordable holographic element is a fluid optical material that forms a non-fluid optical material when exposed to the first and second, and third and fourth light beams.

38. The method of claim 37 wherein the recordable holographic el ement further comprises an UV absorber.

39. The method of claim 33 wherein the method further comprises the step of post curing the recorded optical element with a UV light source.

40. A method for producing an optical lens comprising switching holographic elements, the method comprising the steps of:
a) providing at least one source light beam;
b) splitting the provided source light beams into first, second, third and fourth light beams;
c) providing a recordable holographic element comprising first and second portions;
d) directing the first and second light beams to the first portion of the recordable holographic element;
e) directing the third and fourth light beams to the second portion of the recordable holographic element; wherein
the first and second light beams have proper phase relationships to record a reflection grating structure within the first portion of the recordable holographic element and the third and fourth light beams have proper phase relationships to record a second reflection grating structure within the second portion of the recordable holographic element.

41. The method of claim 40 wherein the recordable holographic element comprises a crosslinkable or polymerizable optical material.

42. The method of claim 41 wherein the recordable holographic element is a fluid optical material that forms a non-fluid optical material when exposed to the light beams.

43. The method of claim 42 wherein the recordable holographic element further comprises an UV absorber.

44. The method of claim 40 wherein the method further comprises the step of post curing the recorded optical element with a UV light source.

45. A method for producing a composite optical lens comprising at least one holographic optical lens element, the method comprising the steps of:
a) providing a first polymerizable or crosslinkable fluid optical material in a first mold;
b) recording a grating structure in the first fluid optical material, thereby forming a non- fluid holographic optical lens element;
c) providing a second mold, the second mold having a cavity volume larger than the non- fluid holographic optical lens element;
d) providing a second polymerizable or crosslinkable fluid optical material and the non- fluid holographic optical lens element in the second mold; and
e) polymerizing or crosslinking the second polymerizable or crosslinkable fluid optical material in the second mold.

46. The method of claim 45 wherein the first and second fluid optical materials are the same fluid optical material.

47. The method of claim 45 wherein the first and second fluid optical materials are chemically compatible materials.